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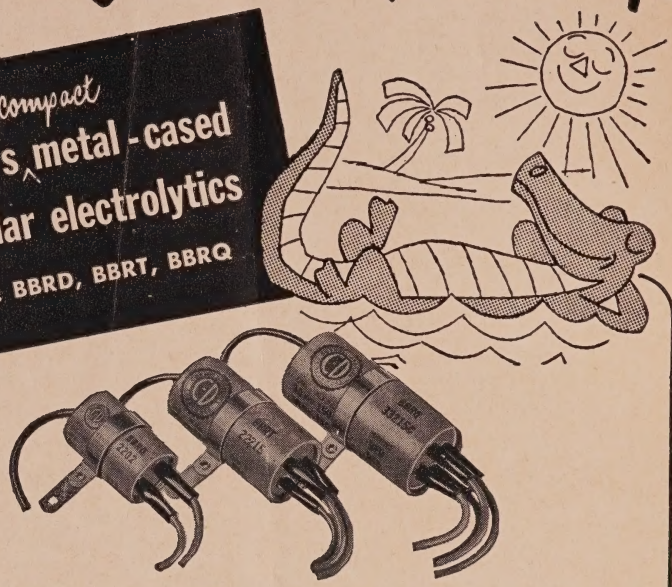

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SPECIAL-PURPOSE RELAY CIRCUITS

The common relay has been referred to elsewhere as an electromechanical amplifier. A dramatic illustration of its apparent amplification is the ability of a sensitive relay operated at 0.0005 microwatt dc to control directly 10 watts. This would indicate a power gain of 20 billion.

Whether or not the reader wants to accept relay action as a type of amplification, he will at least agree that a tremendous control ratio is afforded by the sensitive relay. And the action whereby this control ratio is obtained is one of utmost simplicity.

Relays offer complete separation of input (control-signal) and output (controlled) circuits. This is a desirable feature in any control device. While they do not possess the operating speed of the vacuum tube, relays are desirable in applications where this fast response is of secondary importance and in which the complication of electronic circuits is neither desired nor warranted.

Its use of moving parts and make-and-break contacts is perhaps the greatest disadvantage of the relay. However, modern relay development has provided long-life, reliable contacts and slow-wearing movable parts. High-quality relays presently are available with the ability to operate reliably several million times before breakdown. Further improvements reasonably can be expected.

The relay has many commonplace applications which are very familiar to the electrician and electronic laboratorian. Some of the very elaborate applications, making use of large numbers of relays in a single installation and not so generally familiar as the simpler uses, include dial telephone systems and relay-type digital computers. Between these two extremes, may be found many useful and interesting circuits in which relays, alone or in combination with a few other simple components, perform tasks

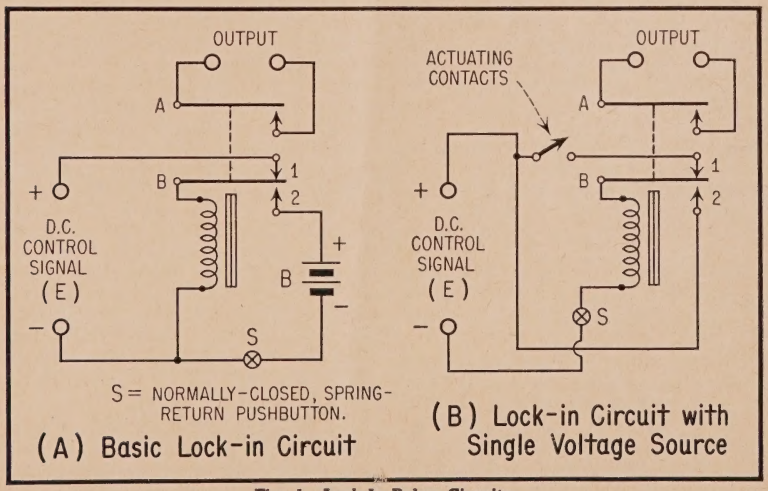

Fig. 1. Lock-In Relay Circuits.

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which otherwise would require complicated machinery or circuitry.

This article describes several practical special-purpose relay circuits which will be of interest particularly to electronic technicians. In most of the samples, the relay itself is the heart of the system, and the circuit as given performs an end-operation. However, any of the circuits can be, and often are, used in conjunction with other electrical or electronic circuits.

Lock-In Relay Circuits

In some applications, it is desirable to have a relay remain closed after the original closing-signal has passed. This feature is obtainable in standard lock-in relays which make use of mechanical latching. This feature is not found in sensitive d-c relays designed to operate on a few milliamperes or microamperes.

Figure 1 shows circuits for obtaining electrical locking. Figure 1(A), a local d-c source (B) must be provided. This source has the same voltage as the d-c control signal (E). Switch S is a normally-closed, spring-return pushbutton type.

The armature (B) of the relay normally rests against contact 1 in the upper position. When the control signal is applied, direct current flows through the relay coil and causes the armature to be drawn away from contact 1. This opens the control-signal circuit, and the movement of the armature continues until contact 2 is touched. When the armature reaches 2, the local battery circuit is closed and current flows from B through the relay coil in the same direction as the original control current. The local current then holds the relay closed. The second movable blade (A) closes the output (controlled) circuit.

Further control-signal pulses can have no effect, since the control-signal input circuit terminating at contact 1 is opened. In this respect, the circuit behaves somewhat like a thyratron, which having been fired ignores further triggering pulses. The relay will remain locked-in until the re-set pushbutton, S, is depressed momentarily to break the local circuit and release the armature which then returns to contact 1. The relay then is ready to be actuated once more by the control signal.

It is important that contact 2 be spaced sufficiently close to the resting armature that inertia will be certain to carry the armature into contact with 2, once it has been drawn away from contact 1. Otherwise, a sustained control signal will cause buzzer action between 1 and B, and a transient input signal will cause the armature merely to open quickly and return again to contact 1.

Figure 1(B) shows a variation of the electrically-locked circuit in which a sustained input voltage can keep the relay closed indefinitely although the actuating switch terminals are closed only momentarily. This circuit has particular application in burglar alarm systems; where, for example, a window switch or door switch might set off an alarm through the circuit and then might be re-opened quickly by the intruder in the expectation of stopping the alarm.

In this circuit, the input labeled D-C CONTROL SIGNAL supplies both the tripping voltage and the holding voltage. The one voltage source serves both purposes. When the actuating contacts are closed, the circuit is completed through the relay coil, and armature B is drawn away from contact 1. Upon reaching contact 2, the top of the coil is transferred to the other side of the actuating switch. Now, if the switch is opened, the relay continues to hold-in. As long as the relay thus is closed, the auxiliary contacts (A) close the external (output) circuit. Operating voltage for the output circuit also may be obtained from the common voltage source.

As in the preceding case (Figure 1A), the relay is released by depressing the re-set pushbutton (S) momentarily. This breaks the coil current

and releases armature B which then returns to its normal resting position against contact 1.

While d-c relays are shown in Figure 1, a-c relays also may be used. In the circuit of Figure 1(A), the hold-in voltage source, B, would be required to have an a-c value equal to that of the a-c control signal voltage (E).

Emergency Receiver Changeover Relay

Emergency standby radio receivers for Conelrad or other important monitoring services should be capable of switching automatically to battery operation in the event of power-line failure.

Figure 2 shows how a small 110-volt dpdt a-c relay can be used for this purpose. The coil of the relay is connected to the a-c power line. Since a small-sized a-c relay, like Ward-Leonard Type 106, can be installed inside the receiver, a handy point for the power line connection is at the line input **ahead of** the ON-OFF switch.

As long as a-c power is available, the relay is held-in and the receiver power supply operates the set. When power fails, the relay drops out and connects batteries to the receiver circuit.

The B-plus service point (common point at which the high-voltage dc is supplied to the receiver circuit) is isolated from the internal power supply and connected to armature A. With power on, this armature closes to contact 1 and connects the B-plus service point to the output of the power supply filter. When power fails, armature A connects the B-plus service point to the B-battery (B_1) through contact 2.

The lead from the ungrounded side of the filament-heating winding of the receiver power transformer is opened and connected to lower terminal 1 of the relay. The ungrounded side of the parallel-filament string in the receiver (the side that formerly was connected to the transformer) then is connected to armature B. With power on, armature B connects the filaments

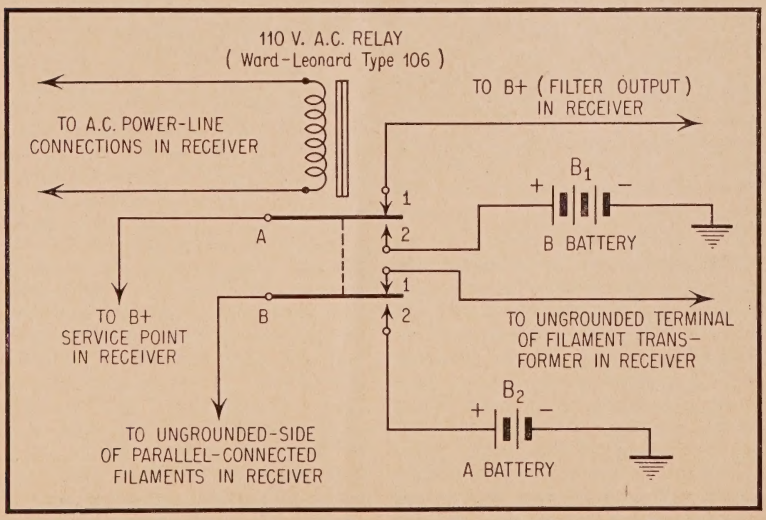

Fig. 2. Automatic Power Supply Changeover Relay for Emergency Receivers.

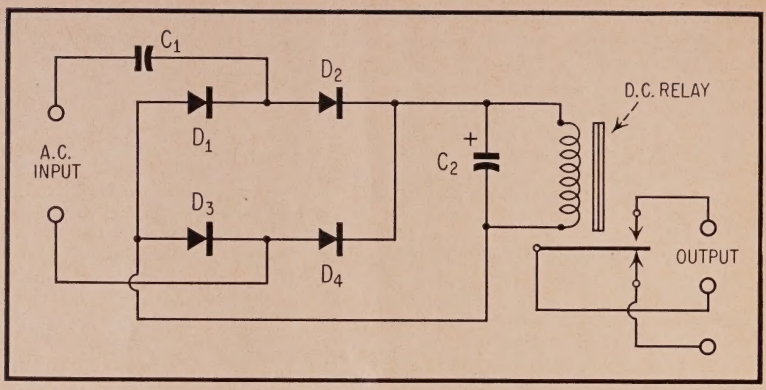

Fig. 3. AC-Operated D-C Relay.

to the a-c supply through contact 1. When power fails, armature B connects the filaments to the A-battery (B_2) through contact 2.

This relay circuit allows continuous reception with unattended service. The emergency batteries are switched-in immediately upon failure of the power line.

AC-Operated D-C Relay

The sensitivity found in milliampere-type d-c relays often is desired also in a-c control circuits, but comparable sensitivity is not found in commercial a-c relays. The expedient usually recommended is rectification of the alternating current for use with the d-c relay.

The simple circuits shown are not always satisfactory. One undesirable byproduct, for example, often is relay chatter. Figure 3 shows an efficient circuit. Full-wave rectification is desirable for maximum ac/dc efficiency and to minimize chatter at low frequencies. Consequently, a bridge rectifier arrangement is employed. Another advantage of the bridge circuit is that it does not require a conductive return path through the signal source, and thus permits the use of a blocking capacitor, C_1. The four diode elements (D_1 to D_4) of this rectifier bridge may be copper oxide, selenium, germanium, or silicon. Copper oxide may be used at frequencies up to 5000 cps, selenium diodes up to 200 kc, and germanium and silicon point-contact diodes up to several hundred megacycles.

The input coupling capacitor, C_1, blocks any d-c component that might be present in the a-c control-signal source and might injure the diodes or relay. Its recommended capacitance is 0.1 to 1 ufd at audio frequencies, and 0.001 to 0.01 ufd at radio frequencies. This capacitor often is omitted when the operator is certain that no dc component will be encountered. Capacitor C_2 is for filter action. Its purpose is to minimize ripple in the rectifier output at low frequencies. This capacitor, usually an electrolytic unit, must have the highest capacitance that can be used with a particular relay. Since this capacitor tends to hold the relay closed after cessation of the control signal, its value must be chosen for a short time constant, with respect to the relay coil resistance. Otherwise, the relay will be sluggish in opening.

This circuit may be used either to record the reception or the loss of a signal. Either desired action may be obtained by using the proper relay output contacts.

Photorelay with Zero Standby Power

Photoelectric relay devices often must stand by for long periods of time without being operated. The resulting power consumption, aging of tubes and circuit components, and possibility of undetected failure are of important concern to designer and user.

A self-generating photocell will operate a sensitive (microampere-type) d-c relay without any additional power supply. This combination makes an efficient light-sensitive relay with unlimited life and operable with zero standby power.

Figure 4 shows the simple circuit of the perpetual photorelay. The self-generating photocell is of the selenium type. Such cells are manufactured by Bradley Laboratories, International Rectifier Corp., and Weston Electrical Instrument Corp. The cell is connected directly to a meter-type d-c relay (Weston Model 705).

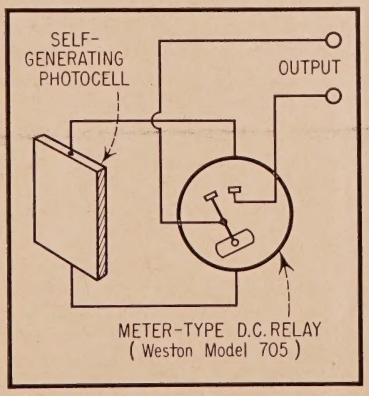

Fig. 4. Zero-Standby-Power Photorelay.

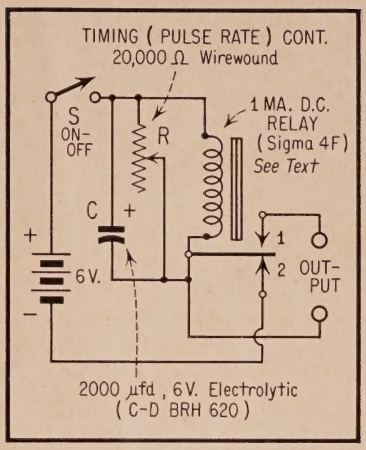

Fig. 5. Pulser.

The relay should be chosen for closure at not more than 100 microamperes. The Model 705 is available at sensitivities as low as 1 microampere, but for normal photoelectric alarms, the 100-ua sensitivity will be adequate. At closure, this relay locks-in magnetically and must be re-set before it can be operated again. This is, of course, ideal for intrusion alarms. Both manual and solenoid re-sets are obtainable, and one or the other should be specified when ordering the relay.

Pulser Circuit

Figure 5 shows a simple device which will close an external circuit repetitively at a selected rate. This arrangement has been used as a pulser and as a metronome. It has been used also to life-test relays.

The armature of the relay normally rests against contact 2. When the ON-OFF switch, S, is closed, capacitor C is charged from the battery, and the relay is closed at the same time. As the armature leaves contact 2, the battery circuit is interrupted. However, the relay is held-in by the voltage

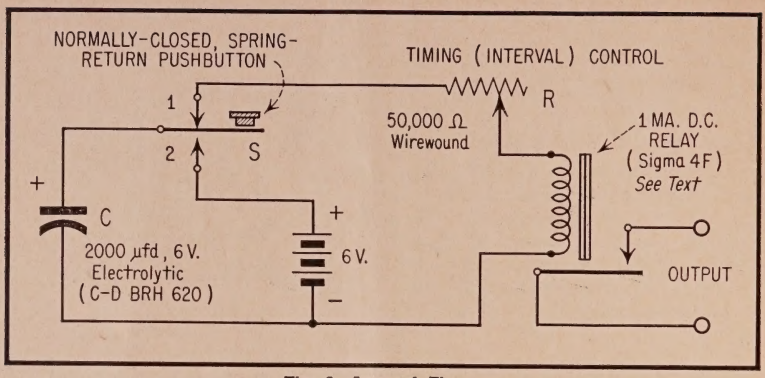

Fig. 6. Interval Timer.

of capacitor C. At a later instant, determined by the setting of rheostat R and the resistance and inductance of the relay coil, the capacitor charge will have fallen to a value too low to maintain the holding voltage across the relay coil. The armature then will return to contact 2 and the process will be repeated.

The armature thus swings back and forth, closing the output circuit through contact 1, at a rate determined by the setting of the rheostat. The armature ticks fastest when R is set to its lowest resistance, and vice versa. The 20,000-ohm rheostat shown in Figure 5 will provide pulsing rates from approximately 2 per second to one in several minutes.

The Sigma 4F relay specified is a 2-milliampere unit. However, this relay can be adjusted for 1-ma closure by turning its upper pivot screw clockwise to release the spring tension.

Interval Timer

The discharge of a high-capacitance electrolytic capacitor through the coil of a sensitive d-c relay is the basis of operation of the interval timer circuit shown in Figure 6. This device may be used to measure time intervals or to operate electrical or electronic equipment over predetermined time intervals. One such application in the latter category is the timed operation of a photographic enlarger or print box.

The normally-closed, spring-return pushbutton switch, S, rests in the upper position with the blade against contact 1. When S is depressed momentarily, it connects the 2000-ufd capacitor, C, across the battery. This charges the capacitor. When S then is released, the capacitor discharges through rheostat R and the relay coil in series. The relay accordingly is actuated and remains closed until the charge has been dissipated below the hold-in current level of the relay.

The length of this interval depends upon the resistance setting of rheostat R, being shortest for the lowest resistance. Timing intervals between approximately 1 and 35 seconds can be obtained.

The Sigma 4F relay as shown in Figure 6 is a 2-milliampere unit, but it can be adjusted easily for 1-ma operation by turning its upper pivot screw clockwise to reduce spring tension.

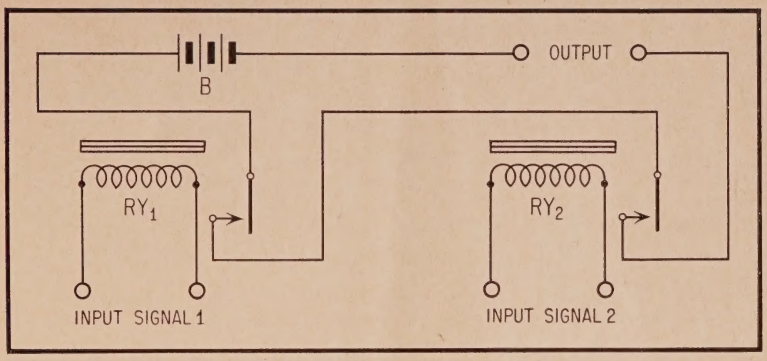

Fig. 7. Coincidence Counter.

Coincidence Counter

A coincidence circuit is one which has no output unless two or more applied input signals are in step with each other. Thus, in a coincidence counter, one output pulse will be delivered whenever two input pulses, for example, occur at the same time. While such circuits are to be found in profusion in computers and in radioactivity measuring equipment, they can be applied to such less esoteric jobs as synchronizing a counter clock with standard-time signals, phasing a pulser with a standard, recording the coincidence of two regularly recurring phenomena in electrical circuits, etc.

The circuit in Figure 7 is shown for two signals of interest. One signal is applied to each relay. Only when both relays are closed will a signal (from battery B) appear at the output terminals. This means that signals 1 and 2 must arrive at the same time. If the signal pulses are of equal width, the output pulse will have the same width only when the two signals overlap in time completely.

The system may be extended indefinitely by adding another relay for each new signal and connecting all relay armatures and contacts in series, as shown in Figure 7. The output may be applied to an electromechanical counter, recorder, or signalling device. The maximum counting rate will depend upon the response speed of the relays used.

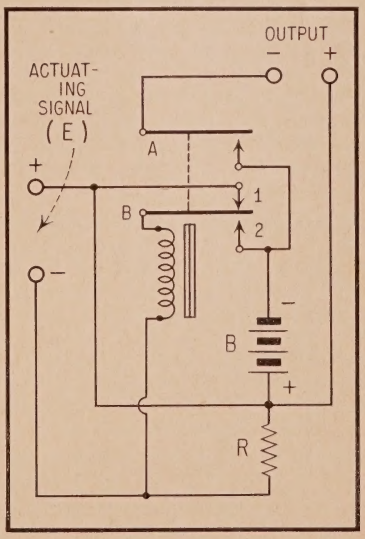

Fig. 8. Scale-of-2 Counter.

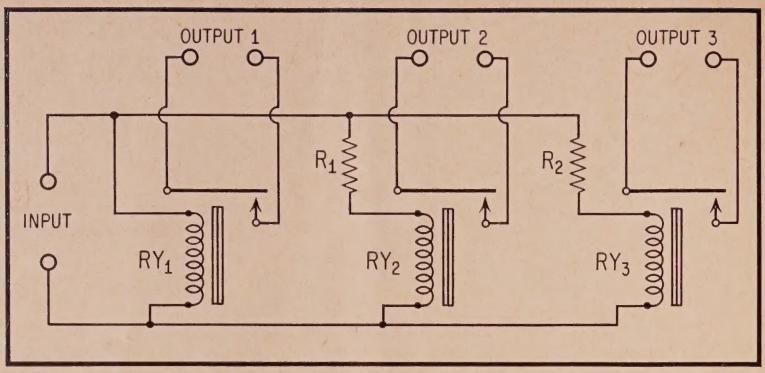

Fig. 9. Sequential Series, Non-Locking Relays.

Scale-of-2 Counter

A scale-of-two counter is a frequency halver, or divider by 2. This function often is performed in electronic gear by the flip-flop multivibrator.

The relay circuit shown in Figure 8 accomplishes low-frequency scale-of-2 counting by an arrangement which allows one input pulse to close the relay and the next pulse to open it. The output circuit thus is closed only by **every other** input pulse, therefore its count is one-half the number of input pulses. The input pulses are all of one polarity.

A short input pulse (actuating signal, E) is applied to the input terminals with the polarity shown. This causes the relay to be closed and to be locked-in electrically by battery B whose voltage is the same as that of the pulse (E). This locking action has already been explained in detail in connection with Figure 1. The upper relay terminals also are held closed, and voltage from battery B also appears at the OUTPUT terminals.

The next input pulse cannot flow through the relay coil because armature B is away from contact 1. This pulse voltage does appear across resistor R and is of correct polarity to buck the battery voltage and cut off the locking current in the coil. This causes the relay to open, returning armature B to contact 1 and removing the voltage from the OUTPUT terminals. The next pulse again closes the relay.

The input pulses must be of short enough duration that the voltage has disappeared from resistor R before armature B arrives at contact 2, otherwise the bucking effect will prevent hold-in of the relay. A second stringent requirement is that resistance R be low, with respect to the relay coil resistance, otherwise it will reduce the coil current below the relay operating level. A good rule is to restrict R to not more than one-tenth of the coil resistance.

Relay scalers may be cascaded to obtain further divisions. Each successive stage will divide the output of the previous stage by 2. In this way, the total number of input pulses may be divided by 2, 4, 8, 16, 32, 64, etc. The maximum counting rate will depend upon the response speed of the relays.

Sequential Series

Relays may be arranged for sequential closure. For example, they might be arranged to pull-in one after the other in order to cut-in various circuit components or operating voltages in a given sequence.

Figure 9 shows such an arrangement with non-locking d-c relays. Upon application of the input control voltage, relay RY1 closes almost instantaneously. Relay RY2 picks up at a later instant, however, because of the resistance (R_1) in series with its coil. The time interval depends upon the value of R_1 and the inductance of the coil of relay RY2. RY3 picks up at a still later interval due to the effect of R_2.

The resistors may be chosen for any desired timing, provided that the resistances do not reduce the relay current below the practical operating level, and that the voltage required for the highest resistance in the setup is not so high that it will damage the coil of relay RY1. When the input signal is interrupted, all relays drop out.

In Figure 10, sequential operation is obtained in the same manner as before, but each relay remains locked-in after closure until the normally-closed, spring-return pushbutton switches (S_1 to S_3) momentarily are depressed. Each relay when closed transmits closing voltage to the succeeding relay in sequence.

The electrical lock-in is obtained in the same manner as explained in connection with Figure 1. However, only one local battery (B) is needed for the entire circuit. All relays must have 3 poles, except the final relay which has 2 poles.

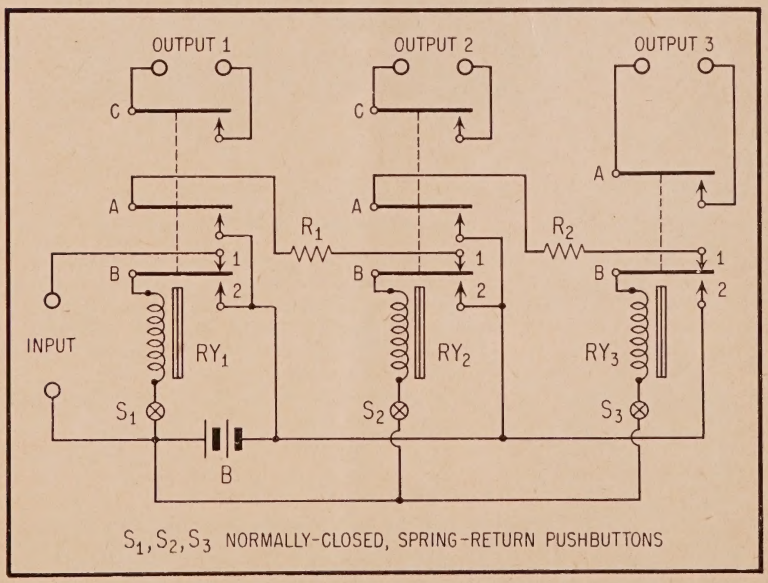

Fig. 10. Sequential Series, Locking Relays.

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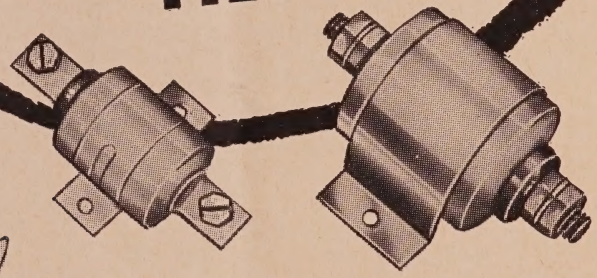

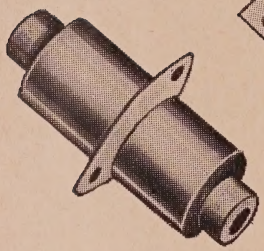

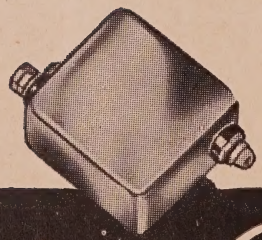

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WANTED — 5" oscilloscope, prefer later model Heathkit, working or not. State lowest price, make, model, cond. and terms. Trade plus cash. Antone L. Oliveira, 94 Potomska St, New Bedford, Mass.

SELL — National SW3 rcvr., 10, 20, 40 meter coils, $15; RME mobile coverter, mc. 55, 10-11-15-20-40-80, l. n., $50; Ampro tape recorder model 731R, l. n., $69.50. E. Hartman, 2401 Fourth Avenue South, St. Petersburg, Fla.

FOR SALE — Webster elec. amp., 9-tube, all-triode, push-pull 2A3's, 3 inputs, 10 w. output, $45; Jackson 636 dynamic roll chart, tube tester, modernized, $40; UTC output transformer LS55, $10. Joseph Wilson, 248 Decatur St., Brooklyn 33, N. Y.

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WANTED — Zenith radio chassis, No. 1206, models 12S345, 12S370, 12S371. Main components must be in good condition. State price. Earl M. Lindsley, Cartwright, N. Dak.

WANTED — ST-203A. Sell or trade 304TL, BC-453, 4 xtals for 5-SB, 2-450 kc., 448 kc., 452 kc., Sonar lo-pass filter, unused GL829B. G. Johnson, 1097 Park Lane, Knoxville, Iowa.

SELL OR SWAP — Xmtr TBS 50-A; 450 v. power supply; Sonar model CFC VFO. L. P. Doucette, Cheticamp Inv. Co., Nova Scotia, Canada.

FOR SALE — Hickok 610A sweep and marker, 505A scope, 203 VTVM with all probes, E-200 Precision sig. gen., 920 tube checker, and S-2 electronic switch. Ralph E. Dorough, 117 Pecan St., Terrell, Texas.

WANTED — Surplus tubes, diode crystals and other electronic gear. Will pay cash and all shipping charges. B. N. Gensler, 330 West 11th St., New York 14, N. Y.

SWAP — Kalart I camera, 3 lenses, flash, case, filters, etc., l. n. Want good tape recorder and small, old TV set in operating cond. C. Storch, 5 Winfield Terr., Great Neck, N. Y.

FOR SALE — Rider RCA Chanalyst incl. UHF conv. and cables, $50; Meissner signal shifter and signal spotter, $40; IRE 1943-1953, $30. Bill Tucker, 456 Colonial Ave., Union, N. J.

WANTED — Set of 85 kc. IF transformers for BC-453 receivers. Stanley Ackerman, 57-47 Marathon Parkway, Little Neck 62, N. Y.

FOR SALE — Heathkit SG-8 sig. gen., $24; Heathkit V-6 VTVM, $35. Both built and tested, test leads and manual, exc. cond. Charles Bailey, 401 Denton Way, Santa Rosa, Calif.

WANTED — National Schools of Los Angeles, Calif., auto mechanics course, used. State price, cond., and year. Ted Solarz, 3033 South Pulaski Rd., Chicago 23, Ill.

WANTED — Harmony records numbers 1300 thru 6503, Velvetone 2340-10503, Clarion 5270-11503, Okeh 41480-41570, Columbia by Ben Selvin 2200-2700, Saurus transcriptions by Rhythmakers, Worlds and Associateds. Ken Crawford, Jr., 215 Steuben St., Pittsburgh 5, Pa.

WANTED — Hallicrafters R-42 8" band reflex speaker. Jim Arthur, 8916 Skokie Blvd., Skokie, Ill.

FOR SALE — Precision series 40 multitester, $12; Eico 377 audio gen., $20. Both l. n. Robert Gossett, 15 Pine Ridge Rd., Weymouth 89, Mass.

FOR SALE — Presto disc recorder portable model Y 16" table, 33⅓ transcription 78 rpm with Presto 1C cutter; Jensen 10" speaker in baffle, table, amplifier, speaker, $325 complete. Warren J. Ford, 204 Brobst St., Shillington, Pa.

SELL OR SWAP — Surplus equip., ART13, dynamotors, tubes (4-250A, 304, 810, 813, 829B etc.) radar surplus, Heathkit scope, VTVM, etc. Want US or ancient coins. Franz, 11 Ellsworth, St. Louis 17, Mo.

FOR SALE — Simpson model 315 sig. gen., 75 to 30,000 kc., l. n., $10. Royal Radio & TV Service, 1494 Genesee St., Buffalo 11, N. Y.

WANTED — Espey 3" TV set in good cond., for cash. Carl Westbery, 231 West Penn St., Hoopeston, Ill.

WANTED — Coil Winding machine, capable of winding universal coils with gear changes. Will pay cash or trade for Rolleiflex camera. Max Hoberman, 11 Godwin Ave., Fair Lawn, N. J.

WANTED — Field strength meter; TV sweep and marker generator; 12 v. DC power supply; tubes. D. T. Willis, 1404 South Jackson, Tucumcari, N. M.

WANTED — Test equipment, cheap. State model, age, cond., and price delivered here. R. B. Johnson, 3922 West 108th St., Inglewood, Calif.

FOR SALE — RCP "Signaligner" sig. gen., model 730, slightl used, same as new, First $20 money order takes it. Blizzard Radio and Electrical Shop, Riverton, W. Va.

WANT TO BUY — Radio and TV service business in U.S.A. or Canada. Must be reasonable. Would also accept radio servicing job. Owen Williams, 3242 6th Rd., Whonock, British Columbia, Canada.

FOR SALE — General Radio AC vacuum-tube voltmeter, type 726-A, $50; General Radio Precision condenser 0-3000 mmf, type 222, $50; General Radio electronic freq meter, type 834B, $50. Prices FOB Pelham, N. Y. Emil Backstrom, Jr., 6 Pel Place, Pelham, N. Y.

SELL OR SWAP — Polaroid sheets approx. 8" x 30" x .030". Have about 1,000. Want tape recorder, photo equip., or sell for reasonable offer. D. A. Sokolov, 42 Paradise Rd., Swampscott, Mass.

TRADE — .380 cal. auto. pistol, 1. n., for Heath or equivalent signal tracer and tube tester in good cond. A. W. Buck, 61 Golf Rd., Plymouth, N. C.

FOR SALE — "Antique" issues of QST from 1922 to 1925; Radio from 1922 to 1924, 2 copies Radio News 1923. Best offer takes all. Hamilton Radio & TV, Winchester, Ind.

SELL OR SWAP — GE induction variable voltage regulator, 13 amps, 115 v.; Allis Chalmers potential transformer 3300 v. to 115 at 50 v. amps. Want hetrodyne freq meter to cover above 20 mc. Slim's, 1147 Sunkist Ave., Waukesha, Wis.

WANTED — Babcock or similar all-band mobile xmtr.; also 250 to 1 kw. xmtr., receiver. Ready for immediate purchase Vernon J. J. Kloepfer, 1356 West North Temple, Salt Lake City, Utah.

WANTED — Western Electric 713C driver unit, KS12027 horn, and 702 network. F. D. Aldrich, 407 North Market St., Frederick, Md.

FOR SALE — Weston 301, 0-1 ma. meter, recently factory checked and calibrated, $6.50; 10" TV set parts cheap; Simpson 4½" 50 microamp. meter, $9.50. James Fred, 1511 Terrace Lane, South Bend 11, Ind.

FOR SALE — Simpson sig. gen., model 315, $310; Rider chanalyst $40; Eico battery eliminator $20; Heath sig. tracer $20; Heath VTVM Y2 $20; Riders 12-15, $12 ea.; GE TC-3 tube checker $25; Solar CE cond. checker $30. S. Pentland, 23 Orchard St., Canajoharie, N. Y.

WANTED — Portable tape recorder in good condition for cash, or trade 3-way portable radios, battery radios; Mallory 6 v., 10 a. battery charger. Gibby Radio and TV Service, Hayesville, N. C.

SELL OR TRADE — Pickering pre-amp and cartridge; Astatic mike, pickups, disc recorder and charger with amplifier, speakers, VHF converter, TV booster and accessories. Want mobile equip. Rudolf F. Graf, 780 West End Ave., New York 25, N. Y.

WANTED — Proximity fuse for display only. Edward P. York, York Marine Radio, Stonington, Conn.

SELL OR TRADE — Masco R-3 tape recorder; 16" professional disc recording lathe; 25 w. PA amplifier; control heads for Motorola car radios; G.I. R-90 recording assembly. Want good scope, or ?? John T. Moore, Box 63, Seneca, S. C.

TRADE — 2-meter TR-4B transmitter and receiver in good condition. Want a 2-meter transmitter 10 or 15 watts. John Gubernard, 21 Arverne Terr, Irvington 11, N. J.

FOR SALE — 400 v. 220 mill power supply with 30 w. 60-cycle amplifier on same chassis; numerous oil-filled condensers and other parts, $8; BC-223 with two tuning units, dynamotor. More information on request. S. Fierston, 224 Eastern Ave., Lynn, Mass.

FOR SALE — Sams Photofacts, 1. n., 210 folders, 21 binders, $441 value for $298. Mark W. Ewald, 4304 Sixth St., Rockford, Ill.

FOR SALE OR SWAP — Amperite RAL-200 ribbon mike, $5; custom built AM tuner in portable case, $10; diamond recording stylus, $2; new PEC cells, $2. J. J. Cermak, 542 Woodside, Hinsdale, Ill.

FOR SALE — Test equipment, 1. n., with instructions; Seco VT grid circuit tester, $10; Peco CRT test adaptor for Precision 612 tube tester, $5. Postpaid if cash order. George V. Hanold, Box 133, Wonewoc, Wis.

FOR SALE — Minerva Tropic Master radio, model W-117, 8-tube, 2-wave band, BC and short wave to 18 mc., gray crackle steel case, tropicalized, $20 plus transportation. Edwin Kubes, Route 3, Box 317, Cumberland, Md.

FOR SALE — RCA type WR39C TV calibrator; RCA type WR59B TV sweep gen. Both in perf. cond., will ship prepaid with manuals and cables in orig. cartons for first $200. Lewis M. Clark, 105 Second St., Campbellsville, Ky.

FOR SALE — National precision micrometer dial type PWO, calibrated 0 to 500, 20 to 1 ratio. Never used, in orig. box, $17. Ernest Peterson, 1590 East 22nd St., Brooklyn, N. Y.

WANTED — Coin mechanism which will operate any household appliance for periods of 15 minutes at a time. Coin slot to be operated with a 5-cent piece. Patsy Paluti, 46A Bataan Ave., Clairton, Pa.

FOR SALE — RCA 15 w. amplifier, $25; Operadio 25 w. amplifier, $25. Robert H. Holm, Audio Recording Service, 1900 University Ave., Madison, Wis.

WANTED — Radio test equipment in trade for gasoline engine, Curtis air compressor, 2 GE ceiling electric fan motors. Thomas F. Elwood, 22 Butler St., Rosebank 5, Staten Island, N. Y.

FOR SALE — Western Electric 124-D amp. and 109-A reproducing group, complete; and 6 spare transformers for above, $100 for the lot. Also D-39-H Audax "Microdyne" arm and cart., $10. H. D. Hollis, 46 Westland Ave., Boston 15, Mass.

FOR SALE — Audak model 12 arm with DL6 cart., $25; Webster 156-27 changer, GE cart., $17; Altec Lansing 604B, network, $115; Altec Lansing A-323B amplifier, 18 w., $50; Miller Hi-Fi AM tuner, $35. 12560 Knoll Dr., Los Altos, Calif.

WANTED — Shortwave rcvr. Give name, model number, cond. number of bands and price. Benjamin Cheskis, 2661 North Napa St., Phila 32, Pa.

FOR SALE — Tubes, like new: 813, $9 ea.; 829, $4 ea.; 866A, 90c ea.; 872, $1.25 ea.; 2C40, $6 ea.; 1625, 20c ea. R. L. Shahan, Route 1, Burton, Wash.

FOR SALE — HRO-5TA1, cash or swap. John Seaman, 1109 Main St., Hellertown, Pa.

WANTED — Sams Vol. 11 to date, in good cond., or whole set if priced right; also good 5" scope. Larry, Route 1, Marion, Ky.

SELL OR SWAP — 2 hand telephone generators or generator and complete crank-style telephone and other phone equip., for amplifier or tube tester in good condition, or ?? Wade's Radio, 6940 North McKenna, Portland 3, Ore.

SWAP — Kodak 35 mm. film, Plus X or Super XX in 100 ft. rolls, fresh stock; for ham gear. A. Nutkis, 121 Wegman, Jersey City 5, N. J.

WANTED — 3PN4 pro. tube; scope; 7½" VTVM; tube checker, for cash or TV tubes. Paul's Electronics, 4309 Kansas Avenue NW, Washington 11, D. C.

WANTED — To correspond with someone interested in both electronics and magic. Object: swaps. Ralph L. White, 76 Barber St., Springfield 9, Mass.

FOR SALE — Garrard RC-10 automatic 78 rpm record changer, in walnut record consolette, separate 10 w. Hi-Fi amp., 10" Cinaudagraph PM spkr. in leatherette covered wall baffle. Bargain. J Lipiner, 1032 Rutland Rd., Brooklyn 12, N. Y.

WANTED — WE 633A dynamic mikes; EV 600D hand mikes; audio amplifiers; 2-conductor mike cables and recording tape. W. Kryger, 4918 Beech St., Hammond, Ind.

FOR SALE — Eico 536 multometer, $10 FOB; RCA color course, make offer. C. Zieg, 942 30th St., San Pedro, Calif.

WANTED — FM tuner, must be in best cond. Have Heath sig. gen., SG7 and/or cash. C. Gabler, 1307 Merriam Ave., New York 52, N. Y.

FOR SALE — Eldico: TR-75-TV xmitter; AM-40 modulator; and VFO-2. Will trade for transmitter of equal value. Jerome Squillaro, RD 3, Box 304, Bangor, Pa.

FOR SALE — Precision E-200 sig. gen., $15, FOB. L. M. Swingle, 4723 48th St. NW, Washington 16, D. C.

WANTED — BC-610 Xmtr. in good cond. Name your price and send information to Baldwinsville High School Radio Club, Elizabeth Street School, Baldwinsville, N. Y.

FOR SALE — For less than inventory, Radio, TV, Music and Record store, sales and service, established 11 years, doing good business. L. Arends, 711 West Sheridan, Shenandoah, Iowa.

FOR SALE — National HRO-7 receiver with four coils, power supply, speaker, exc. cond., $150. Gene Schlig, 717 Crotona Park North, Bronx 57, N. Y.

SELL — Weston portable lab. standard voltmeter, 0-150 v. DC and 0-15 v. DC, accuracy within ½ of 1%, $35 or best offer. S. Consalvo, 4905 Roanne Drive, Washington 21, D. C.

FOR SALE — National NC-44 short wave receiver, complete with tubes, speaker, cabinets, $20; elec. 10" record player, without cabinet, $5; Riders. Want Super Pro. Glenn Watt, 415 West First St., Chanute, Kan.

WANTED — 5TP4 projection TV tube, state cond. and price. W. R. Batten, 1536 Crosby St., Rockford, Ill.

SELL OR SWAP — VTVM, $25; Emerson FM 6-tube set, $20; Motorola 508 with Universal head, $20; ES-500 5" scope, $99.50. Need 7" or ST-2A scope; Simpson 269 meter; Master Course sections 3 and 4. John Pellock, Benld, Ill.

FOR SALE — Unused 10 w. Hi-Fi amplifier, 6-position selector, 4-position bass turnover, 6 treble rolloff positions, bass and treble controls, removable front panel tape output, $39. W. Oppenheimer, 70 Hill St., Brooklyn, N. Y.

SALE OR TRADE — Edwards FM tuner, $20; Millen model 90811 RF final, $35, or trade for Hi-Fi or test equip. S. Winston, Univ. of California Medical Center, Radiological Lab, San Francisco, Calif.

FOR SALE — Motorola Xmtr. T69-20 plug-in coils for 75-20-10-meters, less mike and crystal. Cash price $35 or what have you? Ed Muggli, Glen Ullin, N. D.

SELL — $60 takes 120 w. RF power amp., uses PP 6146's, includes power supply and coils for 20, 40, 80, all in one cabinet with tubes. M. Goodman, 2621 Burns Place, Union, N. J.

FOR SALE — Western Electric type 9-A vertical-lateral pick-up head, new diamond, unused, original case, like new, $30 postpaid. Lester R. Davies, 254 West 54th St., New York 19, N. Y.

FOR SALE — 1955 issues of DeVry Technical School basic radio and electronic courses, 25 booklets, unused, name your price. Leon Kuby, 1472 - 52nd St., Brooklyn, N. Y.

SWAP OR SELL — 14 mfd 2500WVDC oil capacitors, $7 each. Will trade 3" scope, 7" TV chassis with magnifier, 17" TV console, booster, Ampro tape recorder with dictation footswitch for canoe, outboard motor, acqua-lung, or cash. L. Benedict, Bath, Pa.

SELL OR TRADE — Sola model 30M1634 constant voltage xformer with capacitor. Pri. 190 - 250 v., 60 cy. single phase, 4.35 amperes. Sec. 550 v. FOB Covington, Ohio. Harvey Hunter, 1106 Carolyn Ave., Columbus 11, Ohio.

FOR SALE — NC-46, $75; BC-459, $20; UST 10" AM-FM comb. console, $50; 3 Dumont console cabinets, $40 each; 8 mm. Kodak movie camera, $35. Want Geiger counter. Granbard, 61 Howard Ave., Rochelle Park, N. J.

FOR SALE — Eico 221 VTVM, l. n., $15, local preferred. Andrew Adashefski, 10 Catherine Slip, Apt. 3D, New York 38, N. Y.

WANTED — Operating instructions for Model CC-1-60 electric eye solar Capacity Analyzer. Will pay cash. John Lellelid, Colman, S. D.

FOR SALE — Two dynamotors: Pioneer Gen-E-Motor and Gothard, practically new, not surplus, $15 each. Rated at 600 v., 150 MA. William H. Martin, Fife Rd., RD 2, Bridgeville, Pa.

WANTED — MU. cond. tube tester, sig. gen., or 3" scope. H. Chasen, 343 East 55th St., Brooklyn 3, N. Y.

FOR SALE — NRI Radio-TV course, less kit parts, plus Triplett 1213 tube tester. Both for $28 postpaid. Gerald Spector, 273 Chestnut St., Lakewood, N. J.

WANTED — Lettering pen set in good cond., will buy Leroy, etc., or trade electronic gear like capacitor bridge, Sylvania polymeter, 250 IRE Proceedings, 500 QST magazines, or what you want? Electronic Service Co., PO Box 9-231, Richmond 27, Va.

WANTED — Low freq. receiver 15 to 500 kc., such as RBA or RBL Navy type or any commercial receiver to cover above freq. Reasonable priced. A. R. Dimmack, 119 Ridgecrest Rd., Bethlehem, Wheeling, W. Va.

WANTED — Will exchange TV schematic plus service notes for same for 25 Raleigh, Octagon, or Rival coupons. Selcraft, Box 394, Spring Valley, N. Y.

SELL OR TRADE — Comm. receiver kit, 7 tubes, 5 bands, commercial case, less coils, $20 or trade 807s, 813s, xmtr parts, or both cash and parts. Wm. Holleran, 323 Garland St., Edgewood 18, Pa.

FOR SALE — Pilot FM tuner T-601, less dial and cabinet, chassis complete with power supply, good working cond., $15. N. McIlwraith, 1225 Burnette Ave., San Francisco 27, Calif.

SWAP OR SELL — Eico 315 sig. gen.; Riders Operators' Q&A manual; Radio Servicing, Marcus; FM, Rider and Uslan; Radio Engineers' Handbook, 3rd edit., Terman; Industrial Electronics and Control, Kloeffler. All like new. Howard Radio, 727 East 10th St., Brooklyn, N. Y.

WANTED — '54 or '55 Nash auto radio, have model 90651 Millen grid dip meter. William E. Warner, Rt. 3, Box 381, Charleston, W. Va.

FOR SALE — 10" Motorola table model TS-9C TV set, 23 tubes, $14.50; 12½" Philco table model 50T-1403, 23 tubes, $18.95. Ship anywhere. Jones Radio, 1115 Rambler Ave., Pottstown, Pa.

WANTED — Heathkit sig. tracer, T-3. Will pay $10 plus postage if in A-1 cond. R. W. Daniels, 1418 Division St., Hopkins, Minn.

SWAP — Electric trains and parts for good transmitter in working cond. Send for full information with offer. Allen Vinegar, 1565 Odell St., New York 62, N. Y.

SWAP — S-5-10 receiver; odd Nr. tubes; 10 mtr. rig; antique radios; spare parts for 522. C. Fernandez, 81 Warren St., Roxbury 19, Mass.

WANTED — Collins 70E-8A VFO, RME MC-53 mobile converter, also North East Electric Co. 12 v. GA model Dodge generators. John F. Abt, 10 Richards Ave., Stamford, Conn.

FOR SALE — TV and radio books by Kiver, Marcus, Rider, and Uslan, $1.15 each, postpaid. Frank York, 114-38 196th St., St. Albans 12, N. Y.

FOR SALE — Deflection yokes and flyback transformers, working cond., for 10" and 12" sets, $.50 each. Ted Wasek, 106 Beech St., Rutherford, N. J.

WANTED — Tuner for 10" Teletone model 249, IF sound 32.8 mc. picture, 37.3 mc. Must be in alignment. O. J. Cobleigh, 252 Knickerbocker Rd., Closter, N. J.

WANTED — Following TCS-9 equipment: 12/24 v. dynamotor, Navy 21881, Collins 416-T-4; set 65F cables, remote control unit 23270. S. D. Friedman, 85 Newman St., Hackensack, N. J.

FOR SALE — Sound equip.: 35 mm. Weber Syncrofilm sound projector, amplifier can be used as PA system. Best offer. Peter Calderaro, 162 Bradford Street, Everett 49, Mass.

SWAP — Recorder, disc type, playback and cutting head, less amp., and set left-handed golf clubs, cost over $100. What have you? Emory Corron, 4096 Redonda Lane, Dayton 6. Ohio.

FOR SALE — Eldico TR-75 TV Xmitter with 40 and 80 meter coils, low pass filter, never used, $75; Riders 8, 9, 10, $6 each. Want converter, 110 v. AC to 6 v. DC. Melvin Saur, Kent City, Mich.

FOR SALE — Model 275 Globe King, l. n., 40-80 m. coils, $225 COD. Robert O'Neil, RD 3, Ithaca, N. Y.

SELL OR TRADE — 10" metal lathe, completely equipped; Emerson and Motorola 10" TVs, for R/C equip., tape recorder, or cash. J. T. Dumont, Allentown, N. J.

SWAP — 10" TV Stromberg-Carlson, in working order, for outboard motor, wire or tape recorder, or refraction telescope for astronomy study. R. Bost, Poplar Bluff, Mo.

SELL OR SWAP — Heathkit sig. gen., never used; Triplett 666 meter and RCA portable, good cond., less batteries; table radio, not in working cond. Trade for new tubes and Sams Photofacts. Walt's TV, 3064 North "A" St., Philadelphia 34, Pa.

WANTED — Filament transformer and tube socket for 4-1000A; KW antenna tuner; Panadaptor for use with 75-A4. Hadley H. Bower, Telephone Bldg., Oklahoma City, Okla.

FOR SALE — Eico 625 tube tester with CRA pix tube adaptor, $30; Eico 950 condenser and resistor bridge, $15; Eico 1040 battery eliminator, $17.50. All like new, factory wired, FOB. Henry Mohr, 1005 Wyoming St., Allentown, Pa.

SELL OR SWAP — Like new Lumax Electronic flash unit, model 220-1953, works on four flashlight cells. Want tube tester, signal gen., audio gen., or what have you? R. Mackowiak, Chestnut St., Freeland, Pa.

WANTED — Pictorial and schematic diagrams for building a 7" TV set. Wayne Sines, Box 425, RR 1, Oakland, Md.

FOR SALE — Heathkit communications receiver, with cabinet, factory aligned, $25, and BG-1 bar generator, factory aligned, $14; NRI multimeter with RF head, $15. Emerich Jelinek, 13468 Clifton Blvd., Lakewood 7, Ohio.

FOR SALE — Collectors item: Wireless Specialty App. Co., receiver IP 500-SE 143; Navy type 300-3600 meters, l. n., cost $450, sell $50; BC-348 receiver, 110 v. AC, 14 mc. to 500 kc., $65. T. E. Olson, 3017 NE 31st Ave., Portland, Ore.

SWAP — Good Martin 7.2 hp. outboard for equally good HQ-129X. Jim Settle, Elmer, Mo.

SWAP — 1 kw. 220 v. isolation xformer; Carter 6 v. dynamotor; Mallory 557 vibrapack; Heath TS-3. Want latest Elmac equip., mobile antenna. Marks, Macon, Mo.

FOR SALE — Heathkit AT-1 xmitter with ant. coup., AC-1, $34; S-38B, $21, or $50 postpaid for the works. All tubes and manuals, in good cond. Mike Lehmpuhl, 2711 Black Hawk Rd., Wilmette, Ill.

FOR SALE — Stock of radio tubes, condensers, resistors, vol. controls, spkrs., worth $10,000. Sale price $1,500 cash. Located in Clearfield, Pa. E. R. Williams, 807 Park Ave., Kennett Square, Pa.

FOR SALE — Sams Photofacts 1 thru 10 and 15, 1. n., $10 each; ATR 6 v. battery eliminator, $20. E. L. Hein, 2562B Skylark Blvd., Mobile, Ala.

FOR SALE — Portable 16 mm sound movie projector, reconditioned, with screen, stand, splicer, rewinds, spare tubes, two lenses, all access. Licensed operator will teach purchaser how to operate. Make offer. Anton, Projectionist, Unique Theater, 3645 East First, Los Angeles 63, Calif.

FOR SALE — Hickok 610 sig. gen., $90; Eico VTVM, $15; Air King 16" TV console, $60. Want good tape recorder, Sprague KT-1 condenser tester. O. Schwarz, 632 Brookside Pl., Plainfield, N. J.

FOR SALE — Ultra-audio system tape recorder mechanism, model 90, with all data, $15. A. N. Doss, 2400 Ellis St., Brunswick, Ga.

FOR SALE — Dumont 274 oscillograph, 5", in perf. cond. M. Rosenblatt, 66 West Gunhill Rd., Bronx 67, N. Y.

WANTED — Tube tester with pix tube adaptor; VTVM with HV probe. State type, cond., and price. Have RTTA correspondence course, 10" TV, or cash. R. M. Gervais, 8 Spring St., Westbrook, Me.

SELL OR SWAP — All-wave superheterodyne Grunslow 7-tube receiver in wood case, $5; telephone mikes and earpieces, $.50 each; Faco 1629 Supercharger (ant. amp. all-channel TV). Dennis Olmstead, 4709 Tontenelle, Omaha, Neb.

FOR SALE — Collins 310B exciter, l. n., $150; Millen grid dip meter, l. n., $40. E. G. Nickle, 1237 Crane St., Schenectady, N. Y.

FOR SALE — Sprague cond. tester, KT-1, $25; Heath sweep gen., TS-3, $45; Heath battery eliminator, BE-3, $25; Superior picture tube tester, TV40, $12. All perf. cond. Harry Noblitt, Edina, Mo.

FOR SALE — Converted BC-348-Q receiver, postpaid any place in USA, $55. Charles W. Leigh, 162 Passaic St., Trenton 8, N. J.

SELL OR SWAP — Model 425 Eico 5" scope with manual, $25, or 35 mm. camera in exchange. M. P. Bradish, 4682 Park Ave., New York 58, N. Y.

SELL OR TRADE — QST, May '46 thru July '55; IRE Proceedings May '47 to August '55. Trade for portable Geiger counter and cash. E. L. Freud, 206 Manhattan Ave., Hawthorne, N. Y.

SELL OR SWAP — GI R90L disc recorder and playback assembly, 78 and 33⅓ rpm, $15; 37 weekly, 23 monthly issues "Radio World" (discontinued publication — collector's item). Need battery eliminator. Edward Grochmal, 86 Gilligan St., Wilkes-Barre, Pa.

FOR SALE — Feiler stethoscope; RMS bar generator; Philco 7052 dynamic mutual conductance tube checker; Hickok 125 VTVM. All perf. cond., make offer. Bud's Radio & TV Service, 5912 Hampton Ave., St. Louis, Mo.

WANT — Communications receiver or gear for 50 or 220 mc., for Remington portable, Zeiss Tenox 35 mm., 3.5; 410 gauge shotgun. R. Williams, 3989 Wade St., Los Angeles 66, Calif.

WANTED — Precise model 303 3" scope, factory wired, prepaid. Could use unopened kit. Earl H. Stevens, Route 1, Bourbonnais, Ill.

FOR SALE — TVL final tank coils, 500 w. for 10, 20, 40, 80, 160 meter, $10 for all; Bud LF-601 lo-pass filter, $8; Lysco 50 ant. tuner, $10. Steve Solo, 12932 Gable St., Detroit 12, Mich.

FOR SALE — Radio & TV News, Jan., 1952 thru July, 1955., complete set, $10; Audio, Oct., 1953 thru July, 1955, set, $5. Both postpaid in States. T. A. Flournoy, R. 1, Mineola, Tex.

FOR SALE — Original parts, A-1, from Sparton 400 series, Majestic 72, Stromberg-Carlson 55 radio receivers. R. L. Patterson, 104 Carlton Ave., Brooklyn 1, N. Y.

FOR SALE — Simpson 480 genescope, in exc. cond., incl. accessory cables and instruction book, $250. George Beaumont, 1226 Elwell St., Pittsburgh 7, Pa.

FOR SALE — Like new Heathkit power transformer and matching choke for Williamson amplifier, $10; Heathkit preamplifier parts complete, $16; GE triple play variable reluctance pickup with arm, $4.50. M. A. Porter, 1709 North Larrabee St., Chicago 14, Ill.

FOR SALE — Complete 30 w. 10M mobile xmitter installation with Gonset converter, noise clipper, push-to-talk mike; Carter dynamotor (with filter), whip and mount, all cables, $100, or best offer. Pat Tucciarone, 26 Hyatt Ave., Yonkers, N. Y.

FOR SALE — Heath scope, model 0-10, $70; Heath TV alignment gen., TS-3, $40. Both in good cond. V. E. Rivers, Northwood, North Dakota.

FOR SALE — Heathkits, 1955 models: 0-10 scope, VC-2 voltage calibrator for scope, and V-7 VTVM. Make offer for all or separately. You pay shipping. Harlan Bercovici, 3322 North 48th Avenue, Omaha, Neb.

SELL OR TRADE — Hyde Park 19" full door console, new picture tube installed, $100; DeJur 50A autocritic exposure meter, $15; Homart 20" window fan, $30. What have you? A. Cortese, 2431 Crotonia Ave., New York 58, N. Y.

SELL OR TRADE — Transmitting xformers, chokes, oil filter and variable condensers, tubes, meters, switches, blank chassis, coils, bypasses, mike. Want Heath 0-10 scope kit or Precise tube checker kit. Bill Jones, 13 18th St., Greer, S. C.

FOR SALE — Leece-Neville: 6 v. system, 100 amp., alternator, regulator and rectifier, $60; and 12 v. system, $85. Good cond. H. A. Zimmerman, 570 Jamaica Ave., Brooklyn 8, N. Y.

SWAP — Heath TC-1P tube tester; two PE101C, modified, 1. n., $4; HS-33 headset, $2; Weston 301 meters, DC, 10 ma., 1.5 ma., 150 ma., 150 v. AC, $3.50 each. Need Telerad 18A freq meter; Variac. M. Marshall, 455 Washington Avenue, Dumont, N. J.

FOR SALE — Best offer takes like new Permoflux extended range 8" Hi-Fi spkr. in mahog., bass reflex enclosure. H. Gehring, 1200 Stockwell Blvd., El Paso, Tex.

WANTED — Used home disc recorder or recording mechanism such as Wilcox Gay Recordio or General Industries. State make, model, and price. James Brownback, 434 Main St., Royersford, Pa.

SELL OR TRADE — Riders manuals 9, 12, 14; Zenith, Philco, Mallory, Gernback 1 to 5 unabridged. Want ham gear, VFO, meters. E. Tischler, 58 Carey Ave., Wilkes-Barre, Pa.

FOR SALE — RCA Radiola model 18 with speaker, good cond., antique, local only. Donald J. Coyne, 11 Hughes St., Hartford 6, Conn.

SELL OR SWAP — RCA Jr. voltohmyst; Transvision field strength meter; Heathkit TV alignment gen.; NRI tube tester, NRI radio course and other items. Virgil Franceschini, 708 Bigler Ave., Barnesboro, Pa.

TRADE — Rolleicord III camera, f3.5 Xenar lens, case, sunshade, in exc. cond, for good Hi-Fi amplifier, 12" speaker, and enclosure. Bernard Arkenau, 23 Berwyn St., East Orange, N. J.

FOR SALE — Portable TV receiver, withstands roughest travel, 22 tubes, rebuilt with new 7" pix tube, built-in antenna, compact carrying case, tuning range channels 2 thru 13, no batteries, $65. Anton Bruns, Box 520, Los Angeles 66, Calif.

FOR SALE — Philmore NT-200 25 w. transmitter and power supply, in good cond., $20. Leo Campbell, 4 Pilling Rd., North Wilmington, Mass.

SELL OR SWAP — Supreme 542 multitester; panel meters, Weston 301, Triplett 327A, Gruen 0-5 amps. DC; Riders vol. 14; Sams; Musak amplifiers; back issues Electronics; Radio & TV News, Audio, Popular Science. H. Lejuez, 20-31 18th St., Astoria, L. I., N. Y.

FOR SALE — 5" Hickok 670 scope, l. n. Cost $255, sell for $100. J. W. Beatty, 205 North Bath Ave., Waynsboro, Va.

FOR SALE — Seeburg 15 w. amplifier, 15" speaker, mike included, good cond., $25; 5 w. amplifier, inverse feedback, $25. C. Stout, 2241 East Broadway, Muskegon, Mich.

FOR SALE — Transvision 12" TV rcvr.; auto radio, both in working condition. Local preferred. S. J. LoNegro, 14 Madeline Ave., Clifton, N. J.

SELL OR TRADE — Test equip., tubes, parts, manuals. Swap for audio or Hi-Fi equip. Send for list. Ralph Peterson, 42 Clark St., RD 4, Library, Pa.

FOR SALE — 150 w. rotary converter, mobile PA system. Pat McDonald, 116 West 11th St., New York, N. Y.

FOR SALE — Like new Hickok 156A Traceometer, with factory guaranteed condition, $75. Paul Capito, 637 West 21st St., Erie, Pa.

SELL OR SWAP — Mallory VP-557 vibrapack, 6/400 v. at 150 ma., $30; Ohmite rheostats: 18 ohms, 1 to 5 amps., 5" diam.; and 60 ohms, 1 to 5 amps., 8" diam. R. E. Neal, 249 Old Abingdon Hwy., Bristol, Va.

SELL — Heath FM-2 tuner, aligned and tested, $20; Heath grid dip meter GD1B, wired, tested, $15; NRI multitester with cabinet, $10. You pay shipping. Bob Nelson, Box 425, Dassel, Minn.

WANT — Arcosound TO-310 output transformer; AM-FM tuner. State condition, model, price. C. C. Krueger, 1446 29th St., San Diego 2, Calif.

FOR SALE — Pyramid capacitor, resistor analyzer and quick capacitor checker, model CRA-1, l. n., $65. Robert Abbott, 25 Margaretta, Ct., Staten Island 14, N. Y.

FOR SALE — Good paying profitable business, with or without radio and TV sales and service. Overton Bray, Box 276, Paul, Idaho.

FOR SALE — Amateur radio, 130 w. band-switching xmitter, 6L6 osc., pair 807s final, in deluxe cabinet, RF section only, $25; power supply, $12. Gene Augustine, Fenton, La.

FOR SALE — NRI radio fundamentals, $8; TV course by Magnavox, $18; Audels New Radioman's Guide, $3.50; radio operating questions, tests, and answers, $4.75; Radio Data Book, $4; Radio Handbook, $2.50; Gernsback Library (9), $3. Lowe E. Smith, RFD 1, Trion, Ga.

FOR SALE — Regency UHF converter, Astatic booster. L. Wenrich, 8700 First Ave., Silver Spring, Md.

FOR SALE — Viking I, with VFO, TVI suppressed, perf, cond., best offer. John J. Gillen, 912 South 57th St., Philadelphia 43, Pa.

FOR SALE — SCH274 AC converted, 9 units; BC-645, RA34 power supply, 60 w. audio amplifier, 838, C6A, CF6, GL8020 tubes; dummy antenna loading unit; Craftsman 4" jointer and planer. Best offer. E. P. Eardley, 936 Rose Lane, Falls Church, Va.

SWAP — Kalart I camera with 3 lenses, flash, filters, attachments, case, l. n., worth $200; Wilcox electronic flash and expansion, 20 MS delay. Want good used communications receiver. Clifford Storch, 5 Winfield Terr., Great Neck, Long Island, N. Y.

FOR SALE — Simpson 555 tube tester; series E-200-C sig. gen.; 5" Feiler scope, TS-7; model 666-HH volt-ohm-milliammeter; Heatkit vacuum tube voltmeter. $175 for all. Oswald Maillet, 5 Emerold St., Gardner, Mass.

WANTED — Altec-Lansing A-323-B or -A amplifier, preferably with perforated carrying cover, all in good cond. R. B. Easton, Box 37, Aberdeen, S. D.

FOR SALE — Sams Photofacts, l. n., (210 folders, 21 binders), $441 value for $250. Mark Ewald, 4304 Sixth St., Rockford, Ill.

WANTED — Transmitting, special-purpose, Kylstron and other electronic tubes. Cash or swap for your needs. B. N. Gensler, 330 West 11th St., New York 14, N. Y.

FOR SALE — Riders radio manuals, vol. 2 to 23, and TV manuals vol. 5 to 15, for best offer FOB. Albert Salto, 308 Vine St., Sparta, Ill.

FOR SALE — GE radio F70 shortwave, amateur, aircraft and broadcast, 540 - 18000 kc., $15; Heathit SG-5 sig. gen., $19; Universal Mixablend, 2 speeds, $19. John F. Mahoney, 1304 Rosedale Ave., Bronx 72, N. Y.

SELL OR TRADE — Novice transmitter, 6AG 7 osc., 6L6 final, with power supply, for grid-dip meter or what? R. Lorant, 779 Caldwell Ave., New Kensington, Pa.

SWAP — Model 80 W/e wire recorder, value $45, for short wave receiver. William I. Barnard, Route 4, Box 635, Kirkland, Wash.

TRADE — Dynamotors, small 110 v. AC blowers tubes, HS-30 cords, resistors (carbon and power), trimmers, etc., for German (Nazi) WW II war relics, uniforms, badges and medals, army books, and weapons. Louis Schmit, Xavier Hall, Collegeville, Ind.

FOR SALE — Riders radio manuals, 12, 14, 15, 16, also TV manual 1. $5 each or all 5 for $20. You pay shipping. Turner Howard, 511 Sprague Avenue, Kalamazoo, Mich.

SELL OR TRADE — RME-45 rcvr., matching spkr., factory reconditioned, $85; 3-30 Gonset conv., exc. cond., $25; Carter genamotor, 300 v., 200 m., $20; ARC-5 7 mc. trans.; ARC-5 3.5 mc., rcvr. Floyd Bitters, R. 2, Peoria 5, Ill.

WANTED — U.S. or foreign coins or coin collections. Will trade radio tubes, parts or equip. for amateur or serviceman. David J. Bernbaum, 8327 Williams Ave., Philadelphia 19, Pa.

SELL — Fairchild diamond stylus cartridge model 215A for use with 33⅓ and 45 rpm records with matching transformer, model 826A, $20. Gary Feld, 238 Naples Terr., Bronx 63, N. Y.

CASH — For emission tube tester; Sprague TO-3 or equivalent; Heath AA-1, CM-1, C-3, V-7. Trade or sell, LM frequency meter with carrying case and 115 v. AC regulated pack. L. C. Roderick, 1204 Sierra Vista, Alhambra, Calif.

FOR SALE — Simpson 303 VTVM with Hi-voltage test probe, $40. Year old. Nicholas M. Breivogel, 102 Cherrydell Rd., Baltimore 28, Md.

SWAP — "Ridgid" pipe die set, ¼" to 1¼", pipe cutter and vise with stand, used very little. Trade for tape recorder in good operating cond. John Buza, R. 4, Box 116, Jefferson, Ohio.

FOR SALE — Like new Regency RC-600 UHF converter, $21 postpaid. Send M.O. to A. B. Wardman, 106 Rossmore St., East Pittsburgh, Pa.

INFO WANTED — Due to the floods will the party from New York who sent 16" discs to Minneapolis, contact me. I still want 16" discs. Harvey White, 1105 Waller Ave., Winnipeg, Canada.

WANTED — Tape recorder under $80. Charles Wendell, 19 Donald St., Bloomfield, N. J.

FOR SALE — 120 w. VFO controlled (built-in) transmitter, was on 20 meters, plug-in coils in final only, 2 AC power supplies in a Bud enclosed cabinet. Sell in N. Y. C. only. Herbert Paskin, 377 Central Ave., Brooklyn, N. Y.

SELL OR TRADE — El-Tronics SM-3 Geiger counter with new batteries, $165; pair Handie-Talkies with 12 new BA-38 batts., $100; Riders AM-FM vols. 1 thru 21, $150; never used Eico 7" scope, $75. Need service parts. John Snow, 1011 North Forrest, Altus, Okla.

WANTED — Teletone 17" TV, table model, 326, using tap and chassis with 3 tube tuner. In working condition, need not have tubes or cabinet. State price and cond. Stephen M. Skovran, 15 Queen St., Pittsburgh 12, Pa.

FOR SALE — Eico: sweep gen. $30, scope $35, cond. and resistor analyzer $20; Standard tuner $15. All items in good working cond. L. Maenza, 1252 Jefferson Ave., Brooklyn 21, N. Y.

FOR SALE — RCA lab. type beat freq. oscillator 68B and RCA noise and distortion meter type 69B. Suitable for lab. or broadcast station. Cost over $900, best offer. Karl Neuwirth, 16 May Pl., Nutley 10, N. J.

FOR SALE — Riders tech. files, 1. n., in various pack numbers from 2 to 101, only $.95 each. T. W. Hopkinson, Box 921, Charlottesville, Va.

WANTED — Zenith H-1086R or H-1087R Hi-Fi console combination. George A. Cahill, East Dennis, Mass.

FOR SALE — Large quantity of Clarostat volume controls, 30 ohm, wirewound, with DPST switch, small size. Will consider offer for any amount. L. Buddine, 1700 West High St., Haddon Heights, N. J.

FOR SALE — $700 worth of up-to-date TV and receiver tubes, popular brands. Cost $350. Due to blindness must dispose of service stock. Make offer. Carl T. Morris, Southwick Rd., Westfield, Mass.

FOR SALE — Supreme 405-A tube and set tester; MB-26 Sonar 2-meter trans.; Gonset PE101 2-meter conv., mike, aerial, crystal; Precision E-200-C sig. gen., and E-400 sweep sig. gen. Anthony F. Turturro, 146 - 26 North Hempstead Tpke., Flushing, N. Y.

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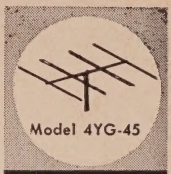
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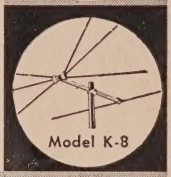
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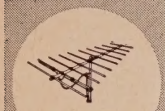
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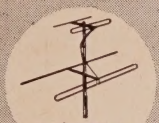
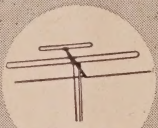

Model HL-4

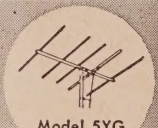
Model 93-FM

Model VV

Model K8-2


Model SL

Model 92-FM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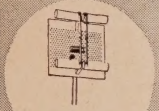
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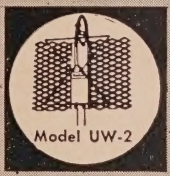
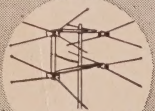
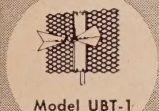

Model UW-2

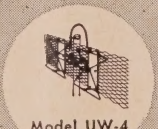
Model UC-1


Model LZX-21

Model S-6


Model UBT-1

Model UW-1-2


Model UW-4

Model V-8

Model VU-1

Model CT-231

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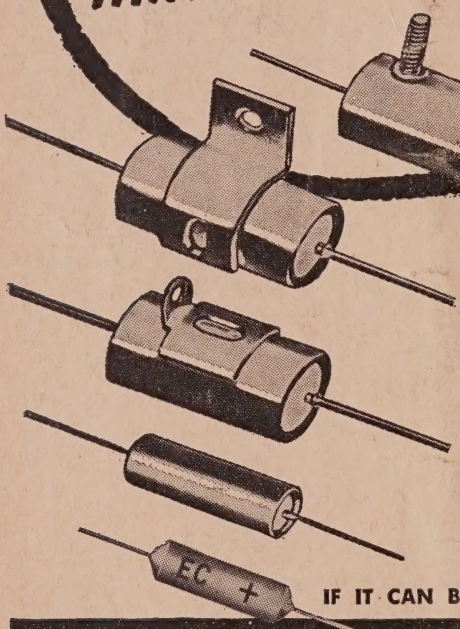

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